

REMARKS

The present application has claims 1-8 pending. Applicants have herein above cancelled claims 6-8 and added new claims 9-18. Support for the new claims can be found in numerous places in the subject application, including:

for new claim 9: on page 5, lines 5-6;

for new claim 10: on page 6, lines 5 and 23-25;

for new claim 11: on page 7, lines 2-3;

for new claim 12: on page 7, lines 2-3;

for new claim 13: on page 6, line 6;

for new claim 14: on page 6, line 6;

for new claim 15: on page 6, lines, 19-20 and in the examples;

for new claims 16-18; in originally-filed claims 6-8.

Applicants have also amended the specification page 2, line 1 and page 7, line 3, to correct a typographical/grammatical error. The word “surside” should read “surface”. Applicants maintain that one of ordinary skill in the art, upon reading the present specification, would know that the term “surside” was incorrect and should read “surface”. Accordingly, Applicants maintain that the amendment to the specification or the introduction of new claims 9-18 do not introduce new matter.

In the Office Action dated June 14, 2005, the Examiner rejected claims 1-7 as unpatentable over Fischer (DE 196 11 510) in view Goller *et al.* (US Patent 4,185,131). Claim 8 was also rejected as unpatentable based on these references and further in view of Ramunni *et al.* (U.S. Patent 6,022,634).

With respect to the rejections based on Fisher and Goller, Applicants respectfully disagree with the Examiner's position. Applicants maintain that the references cannot properly be combined in the manner done so by the Examiner. As the Examiner has recognized, Fischer is silent as to the use of a linear dialcohol with a flash point higher than 100°C as an organic solvent inking vehicle. Rather, Fischer uses glycerine in the ink vehicle. Goller teaches the equivalency of glycerine and ethylene glycol but does so with respect to a different system. The inks set forth in Goller do not contain electrocatalyst material. Rather, Goller is directed to a method for application of carbon particles and a hydrophobic fluorocarbon polymer (see Summary of the Invention; also see, column 4, lines 35-48, wherein Goller describes the making of his suspension containing graphitized carbon and PTFE). The inks taught in Goller do not contain electrocatalyst, but rather the electrocatalyst is applied after the ink is compacted and sintered (see, for example, column 2, lines 20-29; see also, column 5, lines 42-58, where it is taught that after the inking procedure set forth in Goller, the inked layer is then compacted, sintered, and compacted again, before it is ready for catalyzation).

The Examiner has indicated that Goller teaches the functional equivalence of glycerine and ethylene glycol as organic solvent inking vehicle for fuel cell constituents and that “the ink set forth in Goller contains the same electrocatalyst material as Fischer” (see page 7 of the Office Action, citing col. 5, lines 55-65, of Goller). This statement is not correct for the following reasons:

(1) In his specification, Goller expressly states that his new method does not work with “precatalyzed” carbon. See. Column 3, lines 17-18: “The one drawback of this method is that it is not suitable for use with precatalyzed carbon.” In the terminology of Goller, “precatalyzed carbon” is carbon with Pt particles supported on it -- in other words, an electrocatalyst material in supported form.

(2) Reference is made by the Examiner to column 5, lines 55-65, to prove that Goller teaches platinum electrocatalysts – the same as Fischer. However, in the part cited, Goller compares different non-catalyzed flocc electrodes A and B. Electrodes A were made by applying the flocc ink by screen printing, electrodes B were made by applying the flocc ink by spraying. In both cases, the electrodes were then catalyzed. It is noted that electrode B “was not catalyzed by the same technique” as A. The catalyzing method itself was not disclosed. However, in any case, a catalyzation method was used.

Accordingly, Goller is not directed to an analogous ink suspension as that of Fischer or of the present invention – an ink system containing electrocatalyst material. Thus, it is improper to combine Fischer and Goller.

Moreover, a person of ordinary skill in the art field would not combine Fischer and Goller in order to achieve the present invention because Goller actually teaches away from the present invention by stating that his inks do not work with catalyzed carbon.

As previously pointed out, Fischer does not disclose the use of linear dialcohols with high flashpoints and does not disclose their limited use range up to 50% with the balance water, as provided by the present invention. The technical effects of this difference are: no unwanted ignitions, long screen life, and no long activation or conditioning periods.

Linear dialcohol, namely ethylene glycol, is known from Goller. It is used in combination with glycerine in carbon black/PTFE containing inks for screen printing of precursor electrodes on gas diffusion substrates. These inks do not contain any electrocatalyst or water. The electrodes must be catalyzed to render them electrocatalytically active. Furthermore, these electrodes are used with fuel cells containing matrix compartments soaked with electrolytes (see column 1, lines 14-15). This refers to phosphoric acid fuel cells (PAFC). To the opposite, PEM fuel cells use

solid electrolyte membranes (i.e. ionomer membranes). Goller inks are used in a different fuel cell technology.

A person of ordinary skill in the art would not find any hint in the Goller or Fischer references for suggesting their combination. Absence the use of hindsight, the skilled person would have no inclination to combine Fischer and Goller because they address different ink systems, which have different compositions and which are use in different types of fuel cells.

Additionally, the Goller inks are significantly different from the inks of the present invention in that they do not contain ionomers. Instead, Goller inks contain Teflon (PTFE). Upon drying the Goller inks are not electrocatalytically active. They must be catalyzed thereafter (see claim 1 of Goller). In the inks of the present invention, the solvents are in direct contact with the catalyst material and the ionomer material. Upon application of the inks, the layers have to deliver high electrical performance in the PEM cell. It is stated in the specification that the linear dialcohol solvents of the present invention have “surprisingly good adhesion to the polymer membrane” and generate “an intimate contact between catalyst layer and ionomer membrane” (page 5, lines 19-26).

Last but not least, the Goller inks do not contain any water. They contain purely solvents, i.e., a mixture of glycercine and ethylene glycol. Water is not mentioned. However, the water content is an essential feature of the present invention. Water is the

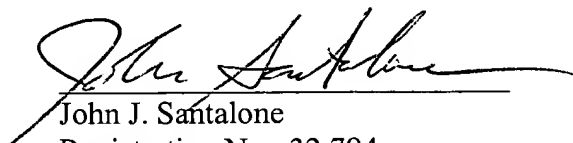
predominant solvent in the ink (minimum amount 50% of the total solvent content of the ink) and it helps to make the process environmentally friendly and safe.

Based on the above remarks, applicants respectfully request reconsideration of the rejections based on the combination of Fischer and Goller. Entry of the present amendment and allowance of the present application are respectfully solicited.

A check in the amount of \$1,020.00 is enclosed to cover the fee for a three-month extension of time. If any additional fees are due, or an overpayment has been made, please charge, or credit, our Deposit Account No. 11-0171 for such sum.

If the Examiner has any questions regarding the present application, the Examiner is cordially invited to contact Applicants' attorney at the telephone number provided below.

Respectfully submitted,


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